ordinary nervous concentration of attention common to the Felidæ before "pouncing." He speaks of larks being attracted in the South of France by means of an octagonal box holding a mirror mounted on a pivot which is turned by the wind. The reflected rays of sunlight dazzle and delight the birds, and they approach near enough to be caught by a spring net. The preliminary phase, that of attention, wherein curiosity perhaps predominates, is illustrated in the known trick of a fox amusing ducks by rolling itself down a bank, as also in the perilous interest excited in a loon by a handkerchief waved by an unseen hand. Many must have experienced, on looking over very high galleries upon floors beneath, or over sheer precipices, an almost uncontrollable impulse to throw themselves headlong down. Can this feeling be described as akin to "fascination"?

L. P. GRATACAP

Amer. Mus. Nat. Hist., N. Y., October 28

A. PERCY SMITH.—The little centipede is *Geophilus electricus*, well known to be occasionally luminous.

HOMAGE TO MR. DARWIN

ON Wednesday, November 3, a deputation from the Yorkshire Naturalists' Union waited upon Mr. Darwin at his residence, Down, Beckenham, Kent, for the purpose of presenting him with an address expressive of admiration for his long devotion to scientific research, and appreciation of the great and important results to which his investigations have led. Prof. Williamson, F.R.S., of the Owens College, Manchester, who is the president of the Union for the current year, was prevented from accompanying the deputation by the pressure of his professorial duties. The deputation arrived at Mr. Darwin's residence about 1 p.m., and was received in a most hearty manner by the great naturalist himself, Mrs. Darwin, and other members of the family. The members of the deputation were introduced individually to Mr. Darwin by Dr. Sorby, vice-president of the Union, and then the interesting ceremony of the presentation of the address was at once proceeded with. After a few words on the work of the Union by Dr. Sorby, the address was read by Mr. Thomas Hick, B.A., B.Sc., and formally presented to Mr. Darwin by Dr. Sorby. Replying to the address, Mr. Darwin assured the deputation of his deep sense of the honour the Yorkshire Naturalists' Union had conferred upon him on that occasion, and only regretted that he had not done something more deserving of such an honour. He had no idea previously that there was so strong a body of working naturalists in Yorkshire, but was pleased to learn that such was the fact, and to find from the *Transactions* that had been forwarded to him that they were doing useful work. Coming from such a body, the address was all the more gratifying to him, though he still feared he hardly merited the good things that had been said of him. The address which had been presented to him he and his family would for ever treasure and preserve, and he desired to express his warmest thanks, both to the deputation and those whom they represented, for it, and for the kind and considerate manner in which everything connected with it had been arranged. Subsequently the deputation were entertained at luncheon, and having spent a short time in familiar conversation with their hospitable host and his family, took their departure amid mutual expressions of kindness and regard.

The following is the text of the Address, which is dated August last:—

To Charles Darwin, LL.D., M.A., F.R.S. &c., &c.

SIR,—The Council and Members of the Yorkshire Naturalists' Union, all of whom, with scarcely an exception, are working students of one or more of the various branches of natural history, desire to express to you in a most respectful manner, and yet with the greatest cordiality, their admiration of your life-long devotion to original scientific research and their high appreciation of the almost unparalleled success of the investigations by which you have contributed so largely to the modern development and progress of biological science.

More especially do they desire to congratulate you on the fact that your great work on the Origin of Species will come of age at an early date, and that your life has been spared long enough to enable you to see the leading principles therein enunciated accepted by most of the eminent naturalists of the day. On the conspicuous merits of that and of your other published works they need not dwell, as those merits have been recognised and admitted even by those who have dissented most strongly from the conclusions at which you have arrived. They may nevertheless be permitted to remind you that your writings have been instrumental in giving an impetus to biological and palæontological inquiries which has no precedent in the history of science, except perhaps in that which followed the promulgation of the gravitation theory of Newton, and that which was due to the discovery of the circulation of the blood by Harvey.

One of the most important results of your long-continued labours, and one for which you will be remembered with honour and reverence as long as the human intellect exerts itself in the pursuit of natural knowledge, is the scientific basis you have given to the grand Doctrine of Evolution. Other naturalists, as you yourself have shown, had endeavoured to unravel the questions that had arisen respecting the origin, classification, and distribution of organic beings, and had even obtained faint glimpses of the transformation of specific forms. But it was left to you to show, almost to demonstration, that the variations which species of plants and animals exhibit, and in natural selection through the struggle for existence, we have causes at once natural, universal, and effective which of themselves are competent not only to explain the existence of the present races of living beings, but also to connect with them, and with one another, the long array of extinct forms with which the palæontologist has made us familiar.

Farther, the Yorkshire Naturalists are anxious to place on record their firm conviction that in the care, the patience, and the scrupulous conscientiousness with which all your researches have been conducted; in the ingenuity of the experiments you have devised; and in the repeated verifications to which your results have been submitted by your own hands, you have furnished an example of the true method of biological inquiry that succeeding generations will deem it an honour to follow, and that cannot but lead to still further conquests in the domain of organic nature.

In presenting this small tribute of their high regard and esteem, the members of the Yorkshire Naturalists' Union cannot but hope and pray that many years of happiness and usefulness may yet remain to you, and that our Science and Literature may be still further enriched with the results of your researches.

(Signed) WILLIAM C. WILLIAMSON, F.R.S., President,
H. C. SORBY, LL.D., F.R.S., Vice-President,
GEORGE BROOK, ter. F.L.S., Secretary,
WM. DENISON ROEBUCK, Secretary,

and Eleven other representative Officials.

THE ATOMIC WEIGHT OF BERYLLIUM

FOR some time chemists have been doubtful what value to assign to the atomic weight of beryllium. Some years ago Prof. Emmerson Reynolds determined the specific heat of this metal to be 0·642; this number multiplied into 9·1 gave 5·8 as the atomic heat of beryllium; in other words it confirmed the generally accepted atomic weight. In 1878 Nilson and Pettersson re-determined the specific heat of beryllium, and found the number 0·408 for the temperature interval 0°–100°; hence these chemists concluded that the atomic weight of the metal must be increased by one-half ($13·6 \times 0·408 = 5·6$). If $Be = 9·1$ the oxide of beryllium is BeO, and the metal is placed in the magnesium group; but if $Be = 13·6$ the oxide is Be_2O_3, and the metal is placed in the aluminium group. But there is no place in Mendelejeff's classification of the elements according to the magnitude of their atomic weights for a metal with the atomic weight 13·6, forming an oxide M_2O_3, and exhibiting the properties of beryllium. The value of Mendelejeff's classification is however so great that chemists were not inclined to alter the atomic weight of beryllium except upon most cogent evidence.

Nilson and Pettersson have recently repeated their determination of the specific heat of beryllium, and find these numbers:—

$$0^\circ\text{–}50^\circ \text{ spec. heat} = 0{\cdot}3973 : 0^\circ\text{–}100^\circ \text{ spec. heat} = 0{\cdot}4246,$$
$$0^\circ\text{–}200^\circ \quad ,, \quad = 0{\cdot}475 : 0^\circ\text{–}300^\circ \quad ,, \quad = 0{\cdot}5055.$$

If the atomic weight is taken as 13·6 then the atomic heat for the interval—

$$0^\circ\text{–}50^\circ = 5{\cdot}46 : 0^\circ\text{–}100^\circ = 5{\cdot}79 : 0^\circ\text{–}200^\circ = 6{\cdot}48 : 0^\circ\text{–}300^\circ = 6{\cdot}9,$$

hence the Swedish chemists conclude that the atomic weight of beryllium is 13·6.

But in the last number of the *Berichte* of the German Chemical Society, Lothar Meyer has calculated, from Nilson and Pettersson's numbers, the true specific heat (*i.e.* the ratio between the quantity of heat required to raise unit weight of the given substance through 1°, starting from the given temperature, and the quantity of heat required to raise unit weight of standard substance through 1°, also starting from the given temperature) of beryllium for various temperatures: his results are as follows:—

(γ = true specific heat at temperature t : $\Delta\gamma$ = value of increase of specific heat for 1°).

$$\overset{t.}{+23^\circ} \ \gamma = 0{\cdot}3973 \ \ldots \ \overset{t.}{73{\cdot}2} \ \gamma = 0{\cdot}4481 \ \ldots \ \overset{t.}{157^\circ} \ \gamma = 0{\cdot}5193$$
$$\Delta\gamma = 0{\cdot}00101 \ \ldots \quad \Delta\gamma = 0{\cdot}00085 \ \ldots \quad \Delta\gamma = 0{\cdot}00063$$
$$\overset{t.}{256^\circ{\cdot}8} \ \gamma = 0{\cdot}5819.$$

Hence the atomic heats of beryllium are:—

$t.$	Be = 9·1.	Be = 13·65.
23°	3·62	5·43
73°	4·08	6·12
157°	4·73	7·10
257°	5·29	8·94

The value of $\Delta\gamma$ decreases as the temperature rises; in this respect beryllium resembles boron, carbon, and silicon. For other elements whose specific heats increase with increase of temperature the value of $\Delta\gamma$ also increases. Lothar Meyer therefore concludes that beryllium is analogous to boron, carbon, and silicon, in that its specific heat increases as temperature increases, and in that the value of this increase is less for 1° at high than at low temperatures. Hence the atomic weight of beryllium is almost certainly 9·1, the oxide is BeO, and the metal finds its place in Mendelejeff's system of classification of the elements according to their atomic weights.

THE PHOTOPHONE

Many readers of Nature will doubtless be glad to know that Mr. Graham Bell's extraordinary experiments may be repeated on a small scale with very simple apparatus, no special appliances being required beyond the mirror transmitter and the selenium receiver, both of which may be easily constructed. I propose to give a short description of an arrangement which has in my hands been very successful.

The mirror is made of the thin mica which is sold by opticians for covering *carte de visite* photographs. It is cut by scissors into a circle $2\frac{1}{4}$ inches in diameter, and silvered by the process for silvering glass specula. The box in which it is mounted is an ordinary wood turned box $2\frac{1}{2}$ inches in diameter. A circular hole of about 2 inches diameter is cut in the lid, behind which the mirror is laid with the reflecting side outwards, a flat ring of vulcanised india-rubber of suitable size and thickness being placed behind the mirror; when the box is closed the ring should hold the mirror firmly in position. If the lid screws on, so much the better. At the bottom of the box is cut a hole, into which is glued one end of a flexible speaking-tube 18 inches long, having at its other end a wooden mouthpiece. It will be found convenient to attach a short wooden arm to the box in a direction perpendicular to its axis. By means of this arm the transmitter may be held in a clamp in any desired position. This completes the transmitter as described by Mr. Bell. I have made a small addition which, though not essential, is a decided improvement. At the back of the mirror I cemented a disk of calico 1 inch in diameter, in the centre of which had been previously inserted a loop of silk half an inch long. A hole $\frac{1}{8}$ inch diameter is bored perpendicularly in the side of the box at a point about $\frac{1}{2}$ inch from the mirror end of it, and in this hole is inserted a piece of watch-spring $1\frac{3}{8}$ inch long, with its flat sides parallel to the top and bottom of the box. The spring is fixed into the hole with wooden plugs so that one end is flush with the outer surface of the box; the other end where it intersects the axis is bent into a shallow hook. Into this hook is slipped the silken loop, and the tension of the spring draws the mirror into a slightly concave form, and seems to make it respond more perfectly to sound vibrations.

By far the most important part of the whole apparatus is the selenium "cell." After making some dozens of different forms, most of which were more or less sensitive, but none satisfactory, I tried the one now to be described, which turned out very successful. Take a slip of mica $2\frac{1}{4}$ inches long and $\frac{3}{4}$ inch broad, and beginning at $\frac{1}{4}$ inch from one end, wind round it in the form of a flat screw some No. 40 copper wire. The pitch of the screw is $\frac{1}{16}$ inch, that is, each wire on the two faces of the mica is $\frac{1}{16}$ inch from its neighbours. Continue winding up to $\frac{1}{4}$ inch from the other extremity; then fix the two ends of the wire by passing them through holes drilled in the mica. Now take a second wire and carefully wind this on beside the other, thus forming a second screw, the threads of which are midway between those of the original one. Fix this as before. Great care must be taken that the two wires do not touch each other at any point: it will be well to make sure of this by testing with a galvanometer before proceeding further. If a lathe is at hand, the tedious operation of winding may be very greatly facilitated. Turn a cylinder of hard wood $4\frac{1}{2}$ inches long and 1 inch in diameter: cut this cylinder longitudinally into two equal parts, and between the two semi-cylinders thus formed place, sandwich-like, a slip of mica of equal breadth. Secure the ends with screws. Smooth down the whole in the lathe, and when the edges of the mica are quite flush with the surface of the wood, cut upon the cylinder a screw of thirty-two threads to the inch. On removing the mica from the cylinder its two edges will be found to be beautifully and regularly notched. Wind the first wire into alternate notches, and the second into the others. The wire should be annealed to take away its springiness and make it lie flat, and the mica should be stout enough to bear tight winding without buckling.

For the succeeding operation a retort-stand at least 15 inches high is convenient. Fix one ring 15 inches above the foot; on a lower ring stand a medium-sized Bunsen burner. On the top ring lay a flat sheet of brass $\frac{1}{16}$ inch thick, and on the brass a piece of mica (to save waste selenium). Place the embryo cell on the mica, laying small weights on its two ends to keep it steady and bring it into closer contact. Having brought the Bunsen burner close under the brass, melt a few grains of vitreous selenium in a small spoon and let four or five drops fall upon different parts of the cell. Spread the melted selenium evenly over the surface with a slip of mica, pressing it well between the wires. During this process the temperature must be carefully regulated by raising or depressing the burner. If it is not high enough, the selenium will begin to crystallise; if too high, the selenium will gather up into drops, being apparently repelled from the surface of the cell. The temperature should in fact be just above the fusing point of crystalline selenium. When a smooth surface is obtained, quickly remove the cell with microscope forceps and let it cool. Its surface will now be smooth and lustrous.

The cell must next be annealed. And here my expe-